What is claimed is:

1. A magnetic resonance imaging system comprising:

static magnetic field generating means for generating a static magnetic field containing a uniform region whose magnetic intensity is

5 uniform;

a couch movable in a predetermined direction passing through the static magnetic field, an object to be imaged being laid on the couch;

a reception multiple RF coil including a plurality of coil members disposed toward the object;

10 position changing means for automatically changing a relative position formed between the couch and the magnet in the predetermined direction in accordance with a length of each of the plurality of coil members detected in the predetermined direction;

scanning means for scanning the object by applying a given train

15 of pulses to the object at each position changed by the position changing means;

reception means for receiving through the multiple RF coils an echo signal that emanates responsively to the application of the train of pulses by the scanning means;

20 reception-processing means for processing, with given processing for reception, the echo signal received by the reception means so that the echo signal is converted into echo data; and

image producing means for producing an MR image based on the echo data converted by the reception-processing means.

25

2. The magnetic resonance imaging system of claim 1, wherein the predetermined direction is a longitudinal direction of the couch and the position changing means is composed by means for moving a position of the couch in the longitudinal direction with the static magnetic field

30 generating means fixed.

3. The magnetic resonance imaging system of claim 2, wherein the position changing means is composed by means for changing the position so that a center position of each of the plurality of coil members

35 in the longitudinal direction agrees with the uniform region of the static magnetic field.

4. The magnetic resonance imaging system of claim 3, wherein the reception processing means includes selection means for automatically selecting, from the echo signals received individually by the

5 plurality of coil elements, the echo signal received by a certain coil member located at the center of the uniform region in the longitudinal direction, the selected echo signal being given to the image producing means.

10 5. The magnetic resonance imaging system of claim 4, wherein the selection means includes signal level detecting means for detecting a level of the echo signal received by each of the plurality of coil members, and signal selecting means for automatically selecting the echo signal received by the coil member located at the center of the uniform region in

15 the longitudinal direction on the basis of changes in the level of the echo signal detected by the signal level detecting means.

6. The magnetic resonance imaging system of claim 3, further comprising ID generating means for generating an ID number inherent to

20 each coil member, the ID producing means being disposed with each of the plurality of coil members, size memorizing means for memorizing a size of each of the plurality of coil members in the longitudinal direction, the size corresponding to the ID number of each coil member generated by the ID generating means, disposal detecting means for identifying

25 each signal line of the plurality of coil members so as to detect a disposal state of the plurality of coil members in the longitudinal direction, and determination means for determining the size by making detection information about the coil disposal state detected by the disposal detecting means refer to the size memorizing means,

30 the position changing means includes means for moving the position of the couch based on the size determined by the determination means, and

the reception-processing means includes selection means for automatically selecting, from the echo signal received by each of the

35 plurality of coil members, a certain echo signal received by the coil member located at the center of the uniform region in the longitudinal

direction on the basis of the size determined by the determination means and the coil disposal state detected by the disposal detecting means, the detected echo signal being given to the image producing means.

5   7. The magnetic resonance imaging system of claim 2, wherein the pulse sequence is set to include the number of encoding steps less than a given number of encoding steps required for reconstructing the MR image by one,

the position changing means is composed of means for changing
10 the position so that, of the plurality of coil members constituting the multiple RF coils, an overlapped region of sensitivity distribution regions of any two members which are mutually-adjoining agrees with the uniform region of the static magnetic field in the longitudinal direction and moving the couch step by step by a distance corresponding to each
15 coil member in the longitudinal direction, and

the image producing means is composed of means for performing unfolding processing on a set of the echo data obtained by the reception processing means at every position of the couch changed by the position changing means on the basis of different sensitivity distributions of the
20 plurality of coil members.

8. The magnetic resonance imaging system of claim 1, wherein each of the plurality of coil members constituting the multiple RF coils is an array type of RF coil has a plurality of coil elements.
25

9. The magnetic resonance imaging system of claim 1, wherein each of the plurality of coil members constituting the multiple RF coils is a whole-body coil.

30   10. The magnetic resonance imaging system of claim 1, wherein the multiple RF coils is fixed to one selected from a group of the object and the couch.

11. A magnetic resonance imaging system comprising:
35   static magnetic field generating means for generating a static magnetic field containing a uniform region whose magnetic intensity is

uniform;

a couch movable in a predetermined direction passing through the static magnetic field, an object to be imaged being laid on the couch;

at least a single reception RF coil disposed fixedly to the static magnetic field generating means;

position changing means for automatically changing a relative position formed between the couch and the magnet in the predetermined direction;

scanning means for scanning the object by applying a given train of pulses to the object at each position changed by the position changing means;

reception means for receiving through the reception RF coil an echo signal that emanates responsively to the application of the train of pulses by the scanning means;

reception-processing means for processing, with given processing for reception, the echo signal received by the reception means so that the echo signal is converted into echo data; and

image producing means for producing an MR image based on the echo data converted by the reception-processing means.

12. The magnetic resonance imaging system of claim 11, wherein the reception RF coil is one in number.

13. The magnetic resonance imaging system of claim 12, wherein the reception RF coil is a whole-body coil used in common for transmission and reception.

14. The magnetic resonance imaging system of claim 13, wherein the train of pulses is set to include the number of encoding steps less than a given number of encoding steps required to reconstruct the MR image by one, and

the image producing means is composed of means for performing unfolding processing on a set of the echo data obtained by the reception processing means at every position of the couch changed by the position changing means on the basis of different sensitivity distributions of the plurality of coil members.

15. The magnetic resonance imaging system of claim 14, wherein the position changing means is composed of means for moving the couch every half of a length of the reception RF coil in the predetermined direction.

16. The magnetic resonance imaging system of claim 11, wherein the position changing means is composed of means for moving the couch to a first couch position and a second couch position, a region to be imaged of the object being located at the first couch position with the region shifted in part from a sensitivity distribution region of the reception RF coil; and the region being located at the second couch position with the region contained entirely in the sensitivity distribution region of the reception RF coil,

the system further including instruction means for instructing a contrast agent to be injected into the object when the couch is located at the second position.

17. The magnetic resonance imaging system of claim 16, wherein the train of pulses is set to include the number of encoding steps less than a given number of encoding steps required to reconstruct the MR image by one,

the scanning means is composed of means for performing both a first sensitivity-distribution measuring scan for measuring a sensitivity distribution of the reception RF coil and a first imaging scan for obtaining the MR image of the region when the couch is located at the first couch position, and for performing both a second sensitivity-distribution measuring scan for measuring a sensitivity distribution of the reception RF coil and a plurality of times of second imaging scans for obtaining the MR image of the region when the couch is located at the second couch position, and

the image producing means includes means for reconstructing the echo data obtained by both of the first and second imaging scans into image data and means for unfolding the image data obtained through each of the second imaging scans by using both of the echo data obtained through the first and second sensitivity-distribution measuring scans

and the image data obtained through the first imaging scan.

18. The magnetic resonance imaging system of claim 16, wherein the reception RF coil is one in number.

5

19. An MR imaging method of obtaining an image of an object based on a sub-encoding technique (fast imaging technique) using a reception RF coil, the object being laid on a couch, the method comprising the steps of:

10   acquiring by acquiring means data of coil sensitivity distributions of the reception RF coil and image data at a plurality of positional relationships between a region to be imaged of the object and the reception RF coil; and

unfolding by data processing means the image data acquired at
15   each position of the object using the data of the coil sensitivity distributions.